WHAT IS CLAIMED IS:

1. An ion source for providing and transporting analyte ions derived from a sample to ion optics having a main axis, the ion source comprising:

a sample chamber configured to receive a sample plate supporting a sample, the sample comprising at least an analyte and a matrix;

an illumination source configured to illuminate at least a portion of the sample on the sample plate to generate analyte ions and particles;

a matrix-protecting interface located between the sample plate and the ion optics, the matrix-protecting interface having a sampling aperture and being configured such that the shortest travel path between the illuminated portion of the sample plate and the sampling aperture is substantially obstructed.

2. An ion source according to claim 1, further comprising:

a gas supply providing a gas flow for influencing particles generated by the action of the illumination source away from the sampling aperture.

3. An ion source according to claim 2, wherein:

the gas supply provides for a flow of gas in a direction substantially orthogonal to the main axis of the ion optics.

4. An ion source according to claim 2, wherein;

the gas supply provides for a flow of gas is in a direction that is not parallel to the main axis of the ion optics.

5. An ion source according to claim 1, wherein the matrix-protecting interface comprises:

a block defining a channel.

6. An ion source according to claim 5, wherein:

the sampling aperture is disposed along a length of the channel.

7. An ion source according to claim 6, further comprising:

a voltage source coupled to the block to provide potentials sufficient to extract analyte ions of interest from the channel.

8. An ion source according to claim 5, wherein:

the channel receives analyte ions and particles in a first ratio of analyte ions to particles, and the sampling aperture transfers a portion of the analyte ions and particles to the ion optics in a second ratio of analyte ions to particles, the second ratio being greater than the first ratio.

9. An ion source according to claim 5, wherein the channel further comprises:

an input and an output for analyte ions of interest.

10. An ion source according to claim 9, wherein:

a ratio of analyte ions to particles exiting the channel via the output is greater than a ratio of analyte ions to particles entering the channel via the input.

11. An ion source according to claim 9, further comprising:

a pump configured to evacuate the channel at the output.

12. An ion source according to claim 1, wherein:

the gas pressure in the sample chamber is between 1 and 10 torr.

13. An ion source according to claim 12, wherein:

the sample chamber is pressurized with a gas at a pressure of approximately 1 torr.

14. An ion source according to claim 9, wherein:

the channel comprises at least one bend.

15. An ion source according to claim 14, wherein:

the bend comprises a first passage adjacent the input, a second passage adjacent the output, and wherein the first and second passages are coupled to one another and approximately orthogonal to each other.

16. An ion source according to claim 14, wherein:

a diameter D, length L, and radii of bend R of the bent channel are selected to satisfy the following conditions: P*D> 2cm*torr, P*R>2 cm*torr and L/D<5.

17. An ion source according to claim 1, wherein:

at least a portion of the matrix-protecting interface is heated.

18. An ion source according to claim 1, wherein:

the illumination source is a pulsed laser source.

19. An ion source according to claim 2, wherein:

a velocity of the gas flow is sustained below 100 m/s.

20. An ion source according to claim 1, wherein:

the ion optics comprises an ion guide.

21. An ion source according to claim 1, wherein:

the ion optics is a component of a mass analyzer.

22. An ion source according to claim 1, wherein:

the ion optics comprises a trapping-type mass analyzer.

23. An ion source for providing and transporting analyte ions derived from a sample to ion optics having a main axis, the ion source comprising:

a sample chamber configured to receive a sample plate supporting a sample, the sample comprising at least an analyte and a matrix;

an illumination source configured to illuminate at least a portion of the sample on the sample plate to generate analyte ions and particles; and

a matrix-protecting interface located between the sample plate and the ion optics, the ion source being configured such that the shortest travel path between the illuminated portion of the sample plate and the input of the ion optics is substantially obstructed.

24. An ion source for providing and transporting analyte ions derived from a sample to ion optics having a main axis, the ion source comprising:

a sample chamber configured to receive a sample plate supporting a sample, the sample comprising at least one analyte and a matrix;

an illumination source configured to illuminate at least a portion of the sample on the sample plate to generate analyte ions and particles;

a matrix-protecting interface located between the sample plate and the ion optics, the matrix-protecting interface comprising:

a gas supply for influencing particles generated by the action of the illumination source away from the ion optics, the gas supply providing a component of gas flow that is directed at an angle x (ranging from zero to 90 degrees) relative to the main axis and directed away from the ion optics; and

a voltage source to provide potentials sufficient to extract analyte ions of interest from the gas flow for transmission to the ion optics.

25. An ion source according to claim 24, wherein:
the angle x is about 90 degrees.

26. An ion source according to claim 24, wherein:
the angle x is greater than zero degrees.

27. An ion source according to claim 24, wherein:
the pressure in the sample chamber is between 1 and 10 torr.

28. An ion source according to claim 27, wherein:

the sample chamber is pressurized with a gas at a pressure of approximately 1 torr.

29. An ion source according to claim 24, wherein:
at least a portion of the matrix-protecting interface is heated.

30. An ion source according to claim 24, wherein:
the illumination source is a pulsed laser source.

31. An ion source according to claim 24, wherein:
a velocity of the component of gas flow is sustained below 100m/s.

32. An ion source according to claim 24, wherein:
the ion optics comprises an ion guide.

33. An ion source according to claim 24, wherein:
the ion optics is a component of a mass analyzer.

34. An ion source according to claim 24, wherein:
the ion optics comprises a trapping type mass analyzer.

35. An ion source according to claim 24, wherein the matrix-protecting interface further comprises:

an annular electrode; and

wherein the gas supply is configured to feed gas into the ion optics, thereby inducing gas counter flow to influence particles away from the ion optics.

36. An ion source according to claim 24, wherein the matrix-protecting interface further comprises:

a plurality of electrodes enclosing a curtain chamber, the electrodes having first and second apertures, the second aperture being smaller than the first aperture;

wherein:

the gas supply is configured to feed gas into the curtain chamber to create a counter flow through the first aperture towards the sample plate to influence particles away from the ion optics; and

the voltage source is configured to focus the extracted ions into the second aperture for transport into the ion optics.

37. An ion source according to claim 24, wherein the matrix-protecting interface further comprises:

a tube located between the sample plate and the ion optics;

the gas supply configured to feed gas into the tube, thereby creating a gas flow parallel to the sample plate; and

an electrode comprising a sampling aperture, the sampling aperture providing for communication between the sample chamber and the ion optics and being located downstream of the gas flow relative to the illuminated portion of the sample plate.

38. An ion source according to claim 24, wherein:

the ion source further comprises a source of UV light of wavelength from 300 to 360 nm configured to illuminate the ion path in any area with gas pressure above 0.1 torr to remove matrix molecules from cluster ions without fragmentation of analyte ions.

39. An ion source according to claim 24, wherein:

the gas pressure in the sample chamber is between 1 and 10 torr.

40. An ion source according to claim 24, wherein:

the gas pressure in the sample chamber is between 10 torr and 1 atmosphere.

41. An ion source according to claim 38, wherein:

the source of UV light is a nitrogen bulb with a filter and a focusing mirror.

42. An ion source according to claim 38, wherein:

the source of UV light is a laser used for ion generation in the MALDI ion source, the laser being configured to provide a beam introduced along the axis of the ion guide and onto the laser illuminated spot.

43. A method for generating and transporting analyte ions derived from a sample to ion optics, the method comprising:

illuminating at least a portion of a sample deposited within a matrix on a sample plate in a sample chamber with UV light to generate analyte ions and particles;

transporting the analyte ions and particles to a matrix-protecting interface located between the sample plate and the ion optics, the matrix protecting interface comprising a channel for a gas flow and a sampling aperture, the channel configured such that a shortest travel path between the illuminated portion of the sample on the sample plate and the sampling aperture is substantially obstructed; and

extracting analyte ions of interest from the gas flow with a voltage source and transmitting the analyte ions through the sampling aperture to the ion optics.

44. The method of claim 43, wherein:

gas pressure in the sample chamber is adjusted around 1 torr to improve ion collisional cooling without excessive formation of cluster ions.

45. The method of claim 43, wherein:

the gas pressure in the sample chamber is adjusted around 10 torr and cluster ions are fragmented by a selectively absorbed UV light.

46. The method of claim 43, further comprising:

applying heat to at least a portion of the matrix-protecting interface.

47. The method of claim 43, further comprising:

sustaining the velocity of the gas flow below 100 m/s.

48. A mass spectrometer comprising:

an ion source of any of claims 1, 5 or 24; and
a mass analyzer.

49. The mass spectrometer of claim 48, wherein:

the mass analyzer is selected from the group consisting of orthogonal time-of-flight (oa-TOF), ion trap (IT), linear ion trap (LIT), orbitrap, FTMS, ion cyclotron resonance (ICR), quadrupole/oa-TOF, LIT-TOF, LIT-oa-TOF, LIT-orbitrap, LIT-ICR, Quadrupole-ICR, and IT-ICR.

50. A method for generating and transporting analyte ions derived from a sample to ion optics, the ion optics having a main axis, the method comprising:

illuminating at least a portion of a sample deposited within a matrix on a sample plate in a sample chamber with UV light to generate analyte ions and particles;

transporting the analyte ions and particles to a matrix-protecting interface located between the sample plate and the ion optics;

influencing particles generated by illumination step away from the ion optics with a gas supply providing at least one component of gas flow that is directed at an angle x (ranging from zero to 90 degrees) relative to the main axis and directed away from the ion optics; and

extracting analyte ions of interest from the gas flow with a voltage source and transmitting the analyte ions to the ion optics.